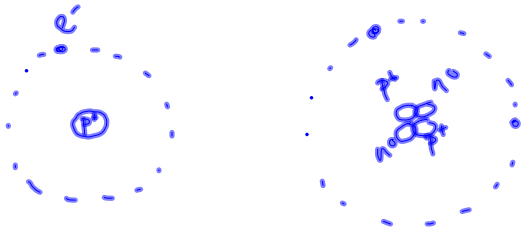
What is electricity?

- physical manifestation of energy
- can be created through friction
- measure in Watts
- Static electricity and current electricity
- Movement of electrons
- Ohms are resistance
- Ben Franklin
- Tesla
- Thomas Edison

Atomic Structure:

	electric charge
- proton } nucleus	+1e
- neutron } nucleus	ø
- electron	-1e

- Valence e^- are important
  - ↳ those e^- in the outermost shell

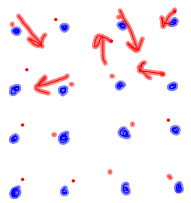


- ion → atom with different # of e^- than p^+

- net positive atom → lose e^-
- net negative atom → gain e^-

- Types of bonding:
  - Ionic → transfer of e^-
    metal/non-metal
  - Covalent → sharing e^-
    non-metal/non-metal
  - Metallic → free-floating e^-

blue → nucleus + inner e^-
red → valence e^-



"sea of e^-"
metal

- Conductor → material that allows e^- to move easily

  metals

- Insulator → materials that do not allow e^- to move easily

  ex: rubber, wood, bone, plastic, cotton

  charge can be on an insulator, it just doesn't move

- Semiconductors → material that can act as either a conductor or insulator

  metalloids, especially Si and Ge

- Law of Conservation of Charge

  Charge is neither created nor destroyed, just transferred.

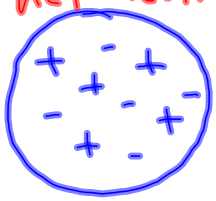
Ways to charge an object:

1. Contact

– two obj. physically touching to transfer e⁻

2. Induction

① conductor net neutral



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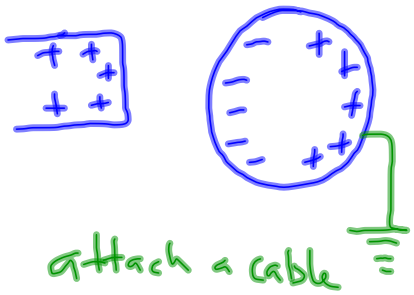

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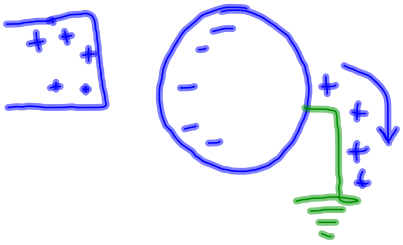
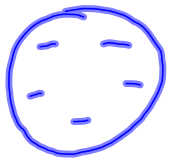


④ remove ground, then take away the rod



Coulomb's Law:

absolute value

$$F = \frac{k_c |q_1||q_2|}{r^2}$$

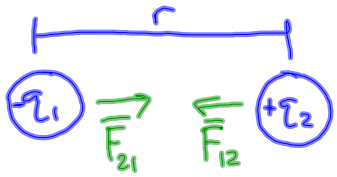
$F \rightarrow$ force

$q \rightarrow$ charge [Coulombs (C)]

$r \rightarrow$ distance between charges

$k_c \rightarrow$ Coulomb's constant

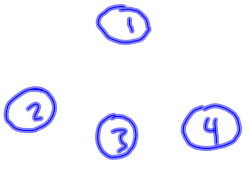
$= 8.99E9 \ N \cdot m^2/C^2$



- Like charges repel, opposite charges attract

- F is a vector! Magnitude from Coulomb's law, direction from attraction/repulsion

- we can find a net force on a particle



$$\vec{F}_1 = \vec{F}_{21} + \vec{F}_{31} + \vec{F}_{41}$$